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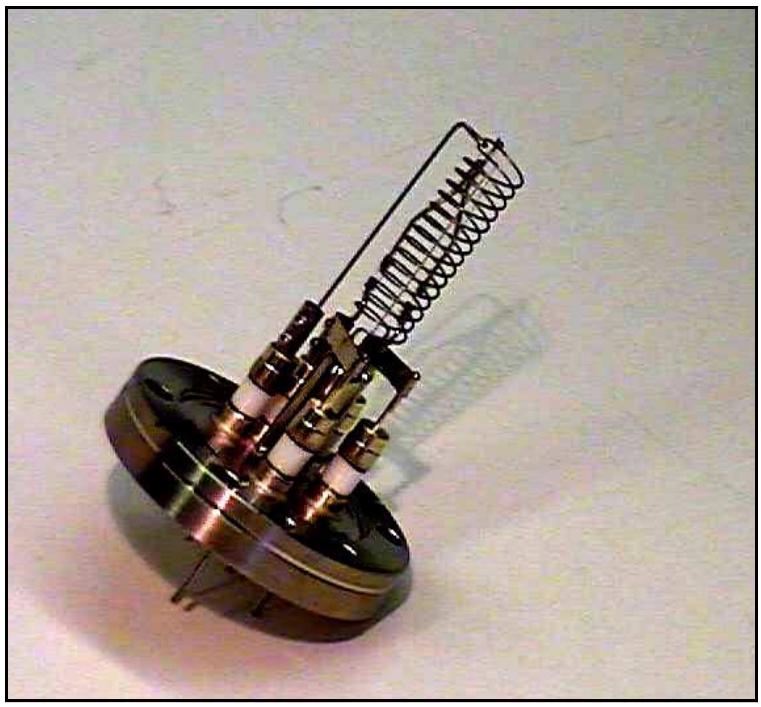
Agilent Technologies

580 Nude Ionization Gauge Tube

INSTRUCTION MANUAL

Manual No. 699905580
Revision C
December 2002

580 Nude Ionization Gauge Tube



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Varian Vacuum Technologies

Warranty

Products manufactured by Seller are warranted against defects in materials and workmanship for twelve (12) months from date of shipment thereof to Customer, and Seller's liability under valid warranty claims is limited, at the option of Seller, to repair, to replace, or refund of an equitable portion of the purchase price of the Product. Items expendable in normal use are not covered by this warranty. All warranty replacement or repair of parts shall be limited to equipment malfunctions which, in the sole opinion of Seller, are due or traceable to defects in original materials or workmanship. All obligations of Seller under this warranty shall cease in the event of abuse, accident, alteration, misuse, or neglect of the equipment. In-warranty repaired or replaced parts are warranted only for the remaining unexpired portion of the original warranty period applicable to the repaired or replaced parts. After expiration of the applicable warranty period, Customer shall be charged at the then current prices for parts, labor, and transportation.

Reasonable care must be used to avoid hazards. Seller expressly disclaims responsibility for loss or damage caused by use of its Products other than in accordance with proper operating procedures.

Except as stated herein, Seller makes no warranty, express or implied (either in fact or by operation of law), statutory or otherwise; and, except as stated herein, Seller shall have no liability under any warranty, express or implied (either in fact or by operation of law), statutory or otherwise. Statements made by any person, including representatives of Seller, which are inconsistent or in conflict with the terms of this warranty shall not be binding upon Seller unless reduced to writing and approved by an officer of Seller.

Warranty Replacement and Adjustment

All claims under warranty must be made promptly after occurrence of circumstances giving rise thereto, and must be received within the applicable warranty period by Seller or its authorized representative. Such claims should include the Product serial number, the date of shipment, and a full description of the circumstances giving rise to the claim. Before any Products are returned for repair and/or adjustment, written authorization from Seller or its authorized representative for the return and instructions as to how and where these Products should be returned must be obtained. Any Product returned to Seller for examination shall be prepaid via the means of transportation indicated as acceptable by Seller. Seller reserves the right to reject any warranty claim not promptly reported and any warranty claim on any item that has been altered or has been returned by non-acceptable means of transportation. When any Product is returned for examination and inspection, or for any other reason, Customer shall be responsible for all damage resulting from improper packing or handling, and for loss in transit, notwithstanding any defect or non-conformity in the Product. In all cases, Seller has the sole responsibility for determining the cause and nature of failure, and Seller's determination with regard thereto shall be final.

If it is found that Seller's Product has been returned without cause and is still serviceable, Customer will be notified and the Product returned at its expense; in addition, a charge for testing and examination may be made on Products so returned.

3/1/00

Hazard and Safety Information

This manual uses the following standard safety protocols:

WARNING

The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.

CAUTION

The caution messages are displayed before procedures, which if not followed, could cause damage to the equipment.

NOTE

The notes contain important information.

Operators and service personnel must be aware of all hazards associated with this equipment. They must know how to recognize hazardous and potentially hazardous conditions, and know how to avoid them. The consequences of unskilled, improper, or careless operation of the equipment can be serious. This product must only be operated and maintained by trained personnel. Every operator or service person must read and thoroughly understand operation/maintenance manuals and any additional information provided by Varian Vacuum Technologies. All warning and cautions should be read carefully and strictly observed. Consult local, state, and national agencies regarding specific requirements and regulations. Address any safety, operation, and/or maintenance questions to your nearest Varian Vacuum Technologies office.

Use with Combustibles and Mixtures

WARNING

As with all ionization gauges, this device is not intrinsically safe. Exercise extreme care when using this vacuum gauge while pumping or backfilling a system or in any other system condition which contains combustible gases or mixtures. The filament, the end of a hot filament ion gauge, and the high voltage discharge of a cold cathode gauge can be ignition sources.

When such a gas or mixture is present, do not turn on any such vacuum gauge.

Failure to follow this instruction could result in serious injury to personnel and damage to equipment.

Vacuum Equipment Cleanliness

Cleanliness is vital when servicing any vacuum equipment.

CAUTION

Do not use silicone oil or silicone grease.

Use powder-free butyl or polycarbonate gloves to prevent skin oils from getting on vacuum surfaces.

Do not clean any aluminum parts with Alconox®. Alconox is not compatible with aluminum and will cause damage.

NOTE

Normally, it is unnecessary to use vacuum grease. However, if it must be used, do not use silicone types, and use it sparingly. Apiezon® L grease is recommended (Varian Part Number 695400004).

Contacting Varian Vacuum Technologies

In the United States, you can contact Varian Vacuum Technologies Customer Service at 1-800-8VARIAN.

Internet users:

- Send email to Customer Service & Technical Support at vpl.customer.support@varianinc.com
- Visit our web site at www.varianinc.com/vacuum
- Order on line at www.evarian.com

See the back cover of this manual for a listing of our sales and service offices.

Introduction

The Varian 580 Nude Ionization Gauge Tube is a rugged broad-range, Bayard-Alpert vacuum gauge. It is capable of measuring a wide range of pressures in vacuum systems with a minimum of error from gauge contamination, charge buildup, and conductance contributions usually associated with gauges having glass envelopes. Careful adherence to stringent manufacturing techniques and standards assures consistency of in-specification operation between gauges. Initial calibration against closely checked McLeod gauge standards insures that this calibration is as well-founded as the state of the art will permit.

This gauge is designed specifically to be as rugged and reliable as the state of the art will permit. It is important for the user, however, to understand the limitations of any ionization gauge for the longest service and most meaningful results.

Unique with its high-pressure capability and low X-ray limit, the 580 tube is usable to $1x10^{-1}$ Torr in argon and $6x10^{-2}$ Torr in air. This is accomplished by the smaller geometry of the tube elements and the use of a conductive platinum coating on the inside of the glass envelope which improves gauge tube performance.

The thoria-coated iridium filament resists burnout from accidental exposure to the atmosphere. When used in argon, the gauge can be operated continuously at $1x10^{-1}$ Torr with no effect on filament life. Gauge life in air may be shortened above $1x10^{-3}$ Torr.

The Varian 580 Nude Ionization Gauge can be used with a variety of commercial controls which are equipped for resistance degassing. It is particularly important to note whether a specific control will exceed any of the maximum ratings noted in this instruction manual. For this reason, it is recommended that this gauge be operated with an ionization gauge control which has been specifically designed for it and thus can take advantage of its broad range.

The Varian 580[1]Nude Ionization Gauge Tube is a broad-range Bayard-Alpert device for measuring vacuum in a wide range of vacuum pressures. Careful adherence to manufacturing techniques and standards insures close agreement between gauges. Initial calibration against closely checked McLeod gauge standards insures that this calibration is as well founded as present state of the art will permit.[2]

In high and ultra-high vacuum ranges, a platinum shield prevents external electrical fields from affecting the low ion current. In higher pressure ranges where the number of ions produced is much greater, the platinum conductive coating drains off the static charge which can build up on the inside of the glass tube. Thus, the 580 tube gives superior performance in stressful environments.

WARNING

Check that your Ion Gauge Controller and vacuum system are separately grounded to a common ground.

Placement of a ground wire between the vacuum chamber and the controller chassis is not safe; large continuous currents could flow through it.

Personnel could be killed by high voltages (160 to 1000 volts) which may be present in an improperly grounded system.

1. US Patent 3153744.

2. See: “A Detailed Examination of the Principles of Ion Calibration”, W.B. Nottingham and F.L. Tomey, Jr. Vacuum Symposium Transactions, 1960, p.117.

Electrical Connections

Make absolutely sure that your vacuum system is grounded as shown in the following schematic diagram

WARNING *Before proceeding, test the system ground to be sure that it is complete and capable of supporting at least 10 Amps.*

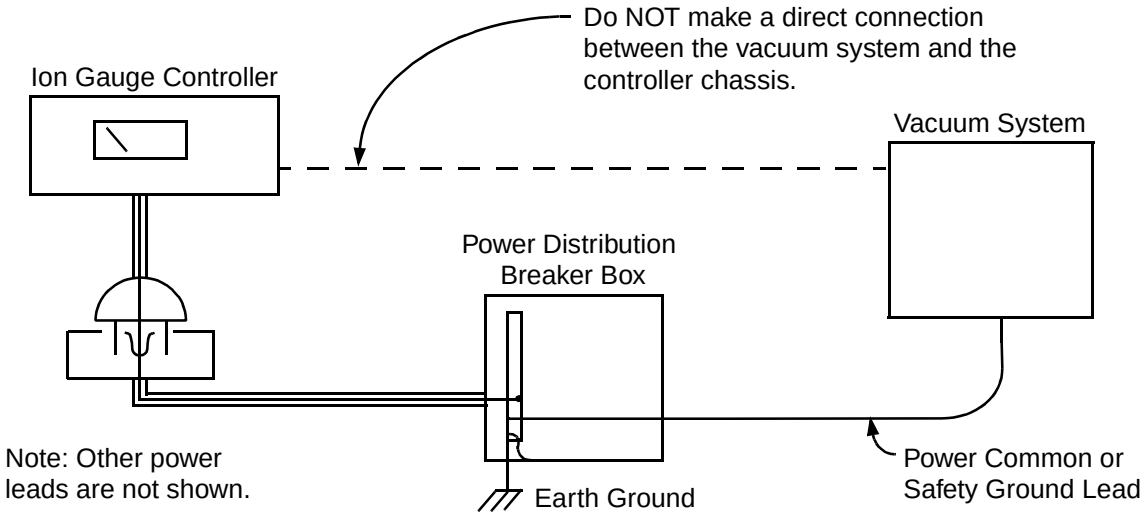
Do NOT make a direct connection between the vacuum system and the controller chassis.
Ion Gauge Controller
Vacuum System
Power Distribution Breaker Box
Note: Other power leads are not shown.
Power Common or Safety Ground Lead
Earth Ground

Figure 1 Electrical Connections

An independent agency has determined that all vacuum chambers, regardless of manufacture, can possibly become charged to lethal voltage levels under certain conditions if they are not grounded with a quality, common ground with the controller of their ionization tube.

WARNING *After each maintenance/service procedure and before operating the controller and vacuum system, verify the integrity of the ground of both units.*

Equipment utilizing these controls should be designed to prevent personnel contact with high voltages.

Always break the primary circuit when direct access to the control unit is required.

Operation

The 580 Nude Ionization Gauge Tube can be used with a variety of commercial controls which are equipped for resistance degassing.

NOTE

It is particularly important to determine if a control will exceed any of the maximum ratings noted in this manual.

Sensitivity

The sensitivity of an ionization gauge is defined as the ion current per unit of pressure at a specified grid (electron) current. Since all ionization gauges are sensitive to the type and pressure of a gas, the gas composition must be known to correctly establish the pressure reading. Table 1 gives the 580 Nude Ionization Gauge Tube sensitivities for air.

Table 1 Gas Sensitivity Parameters

Gas	Gauge Constant S $S = i^+/i^- \times 1/P$
Air	8 per $Torr^{-1}$

where:

S = Sensitivity, $Torr^{-1}$
i^+ = Ion current, Amps
i^- = Grid (electron) current, Amps
P = Partial pressure of the gas, Torr

Specifications

Table 2 Vacuum Specifications

Range	$1x10^{-1}$ to $4x10^{-10}$ Torr
Maximum Operating Pressure	$1x10^{-1}$ Torr (argon); $6x10^{-2}$ Torr (air)
Pumping Speed, ionic	0.06 liters/sec, N_2,1.0 mA
X-ray Limit*	Approx. $4x10^{-10}$ Torr, N_2

* See Section “X-ray Limit” on page 9
** Calibration of production standards only.

Table 3 Physical Specifications

Envelope	Nonex (all models)
Grid	Tungsten “Non-Sag”, 0.025 inch diameter
Filament	Hairpin thoria-coated iridium
Collector	Tungsten, 0.010 inch diameter
Base Leads	Soft nickel, 0.060 inch diameter
Collector Lead	Soft nickel, 0.040 inch diameter
Shipping Weight	3 lbs. (6.6 kg)
Internal Volume	220 cc (not including tubulation)

Table 4 Operating Ratings

Collector	0 VDC (ground)*
Grid	+180 VDC to ground
Filament Bias Voltage	+30 VDC to ground
Filament Voltage	4.0 VAC nominal
Filament Current	Approx. 3.5 Amps AC (1 mA grid current)
Filament Voltage, absolute maximum	6.0 A AC
Filament Temperature, absolute maximum	1400 °C
Absolute Max. Grid Current:	1000 mA

* Collector operated at ground potential through electrometer circuit to reduce noise pickup and leakage currents.

Table 5 Degassing Ratings

Resistance Heating*		**Electron Bombardment**	
Grid Voltage	6.3 VAC	Grid to Filament Voltage	+700 VDC
Grid Current	8.7 Amps AC	Grid Current	100 mA DC
Grid Temperature	1200 °C	Grid Temperature	1200 °C max.
		Filament Temperature	1400 °C

* All values in the Resistance Heating column are absolute maximum ratings. If these values are exceeded, sagging of the grid can occur.

Mounting

The 580 Nude Ionization Gauge Tube mounts in either a vertical or horizontal position and may be operated and degassed in either position for prolonged periods. An outline drawing of the tube is shown in Figure 2.

WARNING

The hot filament can cause ignition of certain vapors which may be present in pressure ranges and compositions within the explosive limits.

Be absolutely sure that power to the gauge is turned off during any operation above 10^{-1} Torr.

Any ionization gauge using a hot filament can show pronounced pumping (gauge pressure lower than system pressure) if the conductance of the pipe connecting it to the system is too low. In general, nude gauges are less affected by this phenomenon, but if the gauge is mounted to the system at the end of a long tube, an effect consistent with the low conductance to the gauge will be measurable.

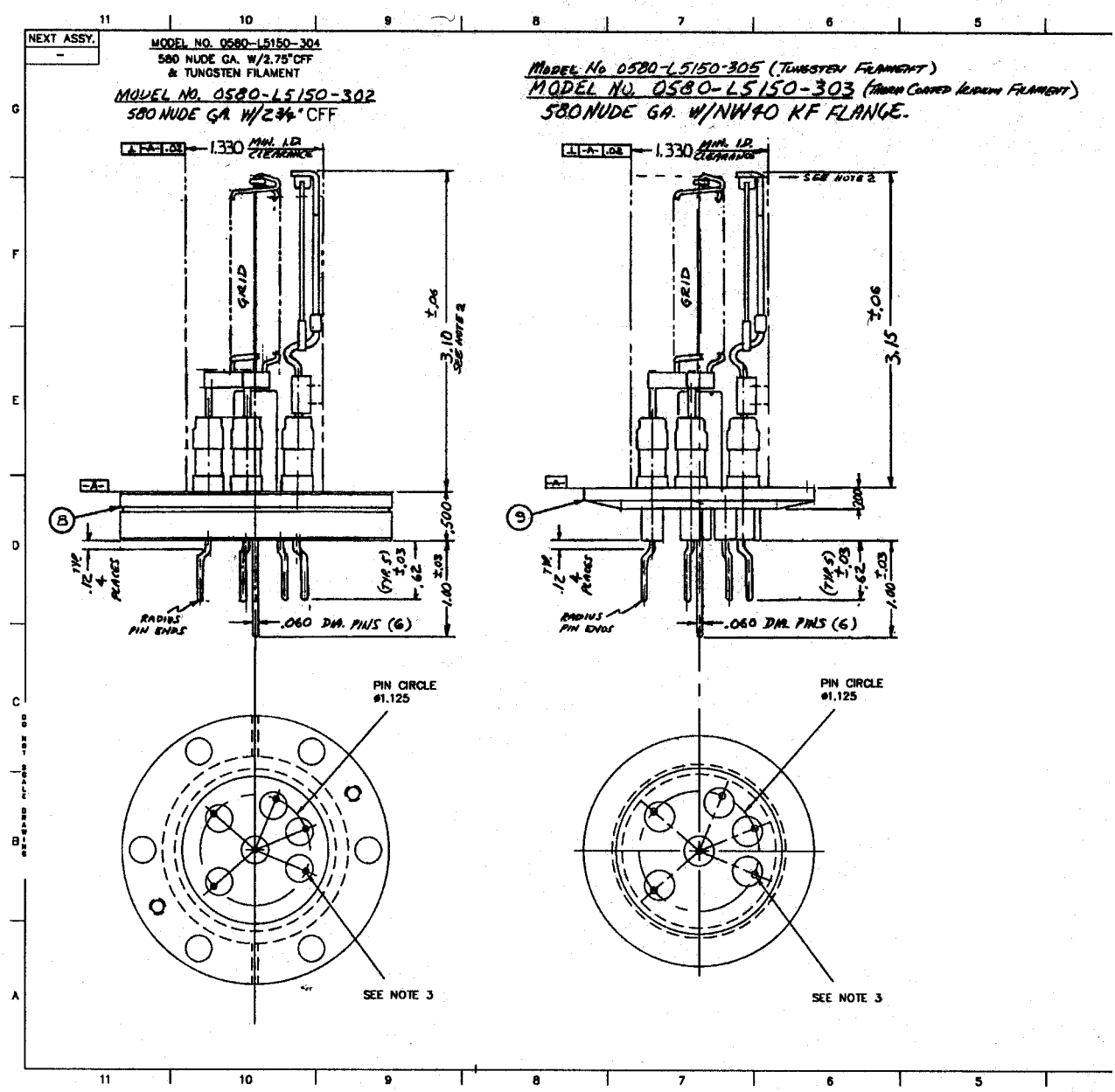

Figure 2 580 Nude Ionization Gauge Tube Outline Drawing

Use of The Gauge Tube

The 580 Nude Ionization Gauge Tube may be used to measure equivalent pressures of gases from 10^{-1} Torr down to the X-ray limit of the gauge. All ionization gauges are composition-sensitive and pressure readings derived from these gauges can only be expressed in terms of equivalent pressure of one gas, usually nitrogen.

Because Bayard-Alpert gauges contain hot filaments, degassing of residual gases in the glass and metal parts of the gauge will occur from the time it is first turned on. It is, therefore, very important to keep the gauge as free from contaminating vapors as possible (diffusion pump fluids, mercury and water vapor, etc.). High temperature baking of the gauge should not be attempted at pressures above 10^{-5} to avoid oxidation of the gauge elements which can make it very difficult to attain ultrahigh vacuum pressure readings. Conversely, ionization gauges cannot be expected to reach low ultimate pressure if the gauge and its connection are not thoroughly degassed.

Degassing

Degassing of the metal parts of the gauge can be done by direct resistance heating of the grid or by electron bombardment of the grid by electrons supplied from the filaments of the gauge. In either case, it is important to use the values of grid voltage and current recommended to prevent damage to the gauge (see Table 5 on page 5). The standard Varian controls provide resistance degassing. In general, electron bombardment will result in a faster cleanup of a Bayard-Alpert gauge, but it must be carefully employed and watched to be efficient and non-hazardous to the gauge. Prolonged degassing at pressures above 10^{-7} Torr is usually unnecessary and of little value since the time to re-absorb common gases at this pressure is very short.

Degassing the gauge by resistance heating will typically require one-half hour or more in the high vacuum range, such as 10^{-9} Torr, depending on cleanliness of the vacuum system and its past history. Degassing should proceed until the pressure during degas has reached a peak, then dropped asymptotically to a lower equilibrium pressure. Allowing the gauge to degas overnight will usually insure this if pressures below 10^{-8} Torr are to be measured.

X-ray Limit

In ionization gauges, X-rays generated by the ionizing electrons hitting the grid produce a photoelectric emission at the ion collector. This causes a lower limit of pressure readings known as the X-ray limit (about $4x10^{-10}$ Torr in the 580 tube). Degassing effects of the gauges are often mistaken for the X-ray limit. Only careful investigation can determine which is the real cause. A second assumption often made is that the X-ray limit is always constant. Among other things, this limit depends on the photoelectric efficiency of the collector surface which, in turn, depends on the amount and type of absorbed gas, etc.

Therefore, as the typical value of X-ray limit is approached ($4x10^{-10}$ Torr nitrogen equivalent), readings should not be considered unequivocal.

Filament Replacement Procedures

If the filaments are burned out (open) or damaged, replacement of the entire will restore the gauge to its original operating condition. The replacement kits are as follows:

Table 6 Filament Replacement Kits

Part Number	580 Gauge – Description	Filament Replacement Kit
L5150302	Thoria-coated Iridium, 2.75" CFF	L5151301
L5150303	Thoria-coated Iridium, NW40 KF	L5151301
L5150304	Tungsten, 2.75" CFF	L5151302
L5150305	Tungsten, NW40 KF	L5151302

To install a filament replacement assembly, proceed as follows (refer to Varian Drawing D-L5150):

1. Loosen the upper set screws, then carefully pull the old assembly from the couplings. It is not necessary to loosen the lower set screws which hold the coupling to the filament pins in the base.
2. Install the filament replacement assembly then tighten the upper set screws while pressing the filament replacement assembly gently toward the grid. This ensures that the filament assembly will not touch the wall of a 1.370-inch ID tube which is the standard tube size for NW-40 or 2¾4 inch ConFlat® flanges.

Gas Correction Factors

Gas correction factor tables are only reproduced for the convenience of the user and do not imply that use with other gases will be safe with hot filament gauge controllers. Table 7 lists relative gauge gas correction factors for various gases. The values are derived by empirical methods substantiated by measurements reported in literature. This table was compiled and published by Robert L. Summers of Lewis Research Center, NASA Technical Note TND-5285, National Aeronautics and Space Administration, Washington, DC, June 1969.

Table 7 Gas Correction Factors

Substance	Formula	Relative Ionization Gauge Gas Correction Factor
Acetaldehyde	C_2H_4O	2.6
Acetone	$(CH_3)_2CO$	3.6 4.0 3.6
Acetylene	C_2H_2	1.9 2.0
Air		1.0 0.98
Ammonia	NH_3	1.3 1.2 1.3
Amylene: ISO· cyclo·	 ISO·C_5H_{10} CY·C_5H_{10}	 5.9 5.8
Argon	Ar	1.3 1.1 1.2 0.9
Benzene	C_6H_6	5.9 5.8 5.7 5.9 6.0
Benzoic Acid	C_6H_5COOH	5.5
Bromine	Br	3.8
Bromomethane	CH_3Br	3.7
Butane: n· ISO·	 n·C_4H_{10} ISO·C_4H_{10}	 4.9 4.7 4.6 4.9
Cadmium	Cd	2.3 3.4
Carbon Dioxide	CO_2	1.4 1.4 1.5 1.5 1.4
Carbon Disulfide	CS_2	5.0 4.7 4.8
Carbon Monoxide	CO	1.05 1.05 1.1
Carbon Tetrachloride	CCl_4	6.0 6.3
Cesium	Cs	4.3 2.0 4.8
Chlorine	Cl_2	0.68 2.6 1.6
Chlorobenzene	C_6H_5Cl	7.0
Chloroethane	C_2H_5Cl	4.0
Chloroform	$CHCl_3$	4.7 4.8 4.8
Chloromethane	CH_3Cl	2.6 3.2 3.1
Cyanogen	$(CN)_2$	2.8 3.6 2.7
Cyclohexylene	C_6H_{12}	7.9 6.4
Deuterium	D_2	0.35 0.38
Dichlorodifloromethane	CCl_2F_2	2.7 4.1
Dichloromethane	CH_2Cl_2	3.7
Dinitrobenzene o· m· p·	$C_6H_4(NO_2)_2$ 	 7.8 7.8 7.6
Ethane	C_2H_6	2.6 2.8 2.5
Ethanol	C_2H_5OH	3.6 2.9
Ethyl Acetate	$CH_3COOC_2H_5$	5.0

Table 7 Gas Correction Factors, continued

Substance	Formula	Relative Ionization Gauge Gas Correction F5tor
Ethyl ether	$(C_2H_5)_2O$	5.1 5.1
Ethylene	C_2H_4	2.3 2.4 2.2 2.2 to 2.5
Ethylene oxide	$(CH_2)_2O$	2.5
Helium	He	0.18 0.15 0.13 0.12
Heptane	C_7H_{16}	8.6
Hexadiene: 1.5· cyclo·	 $1.5{\cdot}C_5H_{10}$ $CY{\cdot}C_6H_{10}$	 6.4 6.0
Hexane	C_6H_{14}	6.6
Hexene: 1· cyclo	 $1{\cdot}C_6H_{12}$ $CY{\cdot}C_6H_{10}$	 5.9 6.4
Hydrogen	H_2	0.46 0.38 0.41 0.45 0.44
Hydrogen Bromide	HBr	2.0
Hydrogen Chloride	HCl	1.5 1.6 2.0 1.5
Hydrogen Cyanide	HCN	1.5 1.6
Hydrogen Floride	HF	1.4
Hydrogen Iodide	HI	3.1
Hydrogen Sulfide	H_2S	2.2 2.2 2.3 2.1
Iodine	I_2	5.4
Iodomethane	CH_3I	4.2
Isoamyl Alcohol	$C_5H_{11}OH$	2.9
Isobutylene	C_4H_8	3.6
Krypton	Kr	1.9 1.7 1.7
Lithium	Li	1.9
Mercury	Hg	3.6
Methane	CH_4	1.4 1.5 1.6 1.4 to 1.8 1.5 1.5
Methanol	CH_3OH	1.8 1.9
Mehtyl Acetate	CH_3COOCH_3	4.0
Mythyl ether	$(CH_3)_2O$	3.0 3.0

Substance	Formula	Relative Ionization Gauge Gas Correction Factor
Naphthalene	$C_{10}H_8$	9.7
Neon	Ne	0.30 0.31
Nitrobenzene	$C_6H_5NO_2$	7.2
Nitrogen	N_2	1.0
Nitrotoluene (o·, m·, p·)	$C_6H_4CH_3NO_2$	8.5
Nitric Oxide	NO	1.3 1.2 1.0
Nitrous Oxide	N_2O	1.5 1.7 1.7 1.3 to 2.1
Oxygen	O_2	1.0 1.1 0.9 0.9
Pentane n· ISO· neo·	 $n{\cdot}C_5H_{17}$ $ISO{\cdot}C_5H_{17}$ $(CH_3)_4C$	 6.2 6.0 5.7 6.0 5.7
Phenol	C_6H_5OH	6.2
Phosphine	PH_3	2.6
Potassium	K	3.6
Propane	C_3H_8	4.2 3.7 3.7 to 3.9 3.6
Propene oxide	C_3H_6O	3.9
Propene: n· cyclo·	 $n{\cdot}C_3H_6$ $cy{\cdot}C_3H_6$	 3.3 3.2 to 3.7 3.6
Rubidum	Rb	4.3
Silver perchlorate	$AgClO_4$	3.6
Sodium	Na	3.0
Stannic iodide	SnI_4	6.7
Sulphur Dioxide	SO_2	2.1 2.3
Sulphur Hexafloride	SF_6	2.3 2.8
Toluene	$C_6H_5CH_3$	6.8
Trinitrobenzene	$C_6H_3(NO_2)_3$	9.0
Water	H_2O	1.1 1.0 0.8
Xenon	Xe	2.9 2.2 2.4
Xylene: o· p·	 $o{\cdot}C_6H_4(CH_3)_2$ $p{\cdot}C_6H_4(CH_3)_2$	 7.8 7.9

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VARIAN

Request for Return
Health and Safety Certification

ISO 9001 REGISTERED

1. Return authorization numbers (RA#) **will not** be issued for any product until this Certificate is completed and returned to a Varian Customer Service Representative.
2. Pack goods appropriately and drain all oil from rotary vane and diffusion pumps (for exchanges please use the packing material from the replacement unit), making sure shipment documentation and package label clearly shows assigned Return Authorization Number (RA#). VVT cannot accept any return without such reference.
3. Return product(s) to the nearest location:

North and South America	**Europe and Middle East**	**Asia and ROW**
Varian Vacuum Technologies	Varian S.p.A.	Varian Vacuum Technologies
121 Hartwell Ave.	Via F.lli Varian, 54	Local Office
Lexington, MA 02421	10040 Leini (TO) – ITALY	
Fax: (781) 860-9252	Fax: (39) 011 997 9350	

For a complete list of phone/fax numbers see www.varianinc.com/vacuum

4. If a product is received at Varian in a contaminated condition, **the customer is held responsible** for all costs incurred to ensure the safe handling of the product, and **is liable** for any harm or injury to Varian employees occurring as a result of exposure to toxic or hazardous materials present in the product.

CUSTOMER INFORMATION

Company name: ……

Contact person: Name: …… Tel: ……

Fax: …… E-mail: ……

Ship Method: …… Shipping Collect #: …… P.O.#:……

Europe only: VAT Reg. Number: …… *USA only*: ❒ Taxable ❒ Non-taxable

Customer Ship To: …… Customer Bill To: ……

……

……

PRODUCT IDENTIFICATION

Product Description	Varian P/N	Varian S/N

TYPE OF RETURN *(check appropriate box)*

❒ Paid Exchange ❒ Paid Repair ❒ Warranty Exchange ❒ Warranty Repair ❒ Loaner Return
❒ Credit ❒ Shipping Error ❒ Evaluation Return ❒ Calibration ❒ Other ……..

HEALTH and SAFETY CERTIFICATION

VARIAN VACUUM TECHNOLOGIES CANNOT ACCEPT ANY BIOLOGICAL HAZARDS, RADIOACTIVE MATERIAL, ORGANIC METALS, OR MERCURY AT ITS FACILITY. CHECK ONE OF THE FOLLOWING:

❒ I confirm that the above product(s) has (have) **NOT** pumped or been exposed to any toxic or dangerous materials in a quantity harmful for human contact.

❒ I declare that the above product(s) has (have) pumped or been exposed to the following toxic or dangerous materials in a quantity harmful for human contact (Must be filled in):

……

Print Name: …… Signature: …… Date: ……/……/……

PLEASE FILL IN *THE FAILURE REPORT SECTION* ON THE NEXT PAGE

Do not write below this line

Notification (RA)#: …… Customer ID#: …… Equipment #: ……

VARIAN

Request for Return
Health and Safety Certification

ISO 9001 REGISTERED

FAILURE REPORT (Please describe in detail the nature of the malfunction to assist us in performing failure analysis):

TURBO PUMPS and TURBOCONTROLLERS

CLAIMED DEFECT		POSITION	PARAMETERS	
❒ Does not start	❒ Noise	❒ Vertical	Power:	Rotational Speed:
❒ Does not spin freely	❒ Vibrations	❒ Horizontal	Current:	Inlet Pressure:
❒ Does not reach full speed	❒ Leak	❒ Upside-down	Temp 1:	Foreline Pressure:
❒ Mechanical Contact	❒ Overtemperature	❒ Other:	Temp 2:	Purge flow:
❒ Cooling defective	❒ Clogging	……	OPERATION TIME:	
Describe Failure :				
TURBOCONTROLLER ERROR MESSAGE:				

ION PUMPS/CONTROLLERS

❒ Bad feedthrough	❒ Poor vacuum
❒ Vacuum leak	❒ High voltage problem
❒ Error code on display	❒ Other
Describe failure:	
Customer application:	

VALVES/COMPONENTS

❒ Main seal leak	❒ Bellows leak
❒ Solenoid failure	❒ Damaged flange
❒ Damaged sealing area	❒ Other
Describe failure:	
Customer application:	

LEAK DETECTORS

❒ Cannot calibrate	❒ No zero/high background
❒ Vacuum system unstable	❒ Cannot reach test mode
❒ Failed to start	❒ Other
Describe failure:	
Customer application:	

INSTRUMENTS

❒ Gauge tube not working	❒ Display problem
❒ Communication failure	❒ Degas not working
❒ Error code on display	❒ Other
Describe failure:	
Customer application:	

ALL OTHER VARIAN PUMPS

❒ Pump doesn't start	❒ Noisy pump (describe)
❒ Doesn't reach vacuum	❒ Overtemperature
❒ Pump seized	❒ Other
Describe failure:	
Customer application:	

DIFFUSION PUMPS

❒ Heater failure	❒ Electrical problem
❒ Doesn't reach vacuum	❒ Cooling coil damage
❒ Vacuum leak	❒ Other
Describe failure:	
Customer application:	

varian
vacuum products

VPD Service Operation

Returned Material Report

This report must accompany all products returned for repair, replacement, or warranty evaluation. Full information regarding reasons for return of the product will expedite repair or adjustment. Please fill in all blanks below and furnish any other information which will help identify the nature and cause of failure.

Reason for Return (check appropriate box)

- ☐ Paid Repair
- ☐ Advance Exchange
- ☐ Shipping Error
- ☐ Credit
- ☐ Warranty Evaluation
- ☐ Loaner Return
- ☐ Shipping Damage

Product Information (use separate forms if more than one model no.)

Varian Model No. _____ Serial No. _____ Quantity _____

Part Description _____

Purchase Information (if product is being returned for warranty evaluation, show your original purchase order number and date purchased)

Varian Sales Order No. (if available) _____ Machine # _____

Original Purchase Order No. _____ Purchase Order Date _____

Company Name _____ **Contact** _____

Address _____

City _____ **State** _____ **Zip** _____

Telephone _____

Failure Report (describe in detail suspected cause or nature of malfunction)

_____

_____

_____

_____

_____

Returned Products

All products returned to Varian/VPD Service Operation for warranty evaluation must be sent **prepaid** and customer must comply with the **warranty replacement and adjustment** provision set forth in the warranty.

Ship directly to: Varian Vacuum Products
Vacuum Products Service Center
121 Hartwell Avenue
Lexington, MA 02421

All products sold by Varian and returned by customer are subject to Varian Vacuum Products standard terms and conditions of sale including, but not limited to, the warranty and damages and liability provisions set forth in the warranty.

November 1995

Varian Vacuum Technologies
Sales and Service Offices

Argentina
Varian Argentina Ltd.
Sucursal Argentina
Av. Ricardo Balbin 2316
1428 Buenos Aires
Argentina
Tel: (54) 1 783 5306
Fax: (54) 1 786 5172

Benelux
Varian Vacuum Technologies
Rijksstraatweg 269 H,
3956 CP Leersum
The Netherlands
Tel: (31) 343 469910
Fax: (31) 343 469961

Brazil
Varian Industria e Comercio Ltda.
Avenida Dr. Cardoso de Mello 1644
Vila Olimpia
Sao Paulo 04548 005
Brazil
Tel: (55) 11 3845 0444
Fax: (55) 11 3845 9350

Canada
Central coordination through:
Varian Vacuum Technologies
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel: (781) 861 7200
Fax: (781) 860 5437
Toll Free: (800) 882 7426

China
Varian Technologies - Beijing
Room 1201, Jinyu Mansion
No. 129A, Xuanwumen Xidajie
Xicheng District
Beijing 1000031 P.R. China
Tel: (86) 10 6641 1530
Fax: (86) 10 6641 1534

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7 avenue des Tropiques
Z.A. de Courtaboeuf – B.P. 12
Les Ulis cedex (Orsay) 91941
France
Tel: (33) 1 69 86 38 13
Fax: (33) 1 69 28 23 08

Germany and Austria
Varian Deutschland GmbH
Alsfelder Strasse 6
Postfach 11 14 35
64289 Darmstadt
Germany
Tel: (49) 6151 703 353
Fax: (49) 6151 703 302

India
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101-108, 1st Floor
1010 Competent House
7, Nangal Raya Business Centre
New Delhi 110 046
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Tel: (91) 11 5548444
Fax: (91) 11 5548445

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Sumitomo Shibaura Building, 8th Floor
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Shinsa 2nd Building 2F
966-5 Daechi-dong
Kangnam-gu, Seoul
Korea 135-280
Tel: (82) 2 3452 2452
Fax: (82) 2 3452 2451

Mexico
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Concepcion Beistegui No 109
Col Del Valle
C.P. 03100
Mexico, D.F.
Tel: (52) 5 523 9465
Fax: (52) 5 523 9472

Taiwan
Varian Technologies Asia Ltd.
14F-16 No.77, Hsin Tai Wu Road Sec. 1,
Hsi Chih, Taipei Hsien
Taiwan, R.O.C.
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Fax: (886) 2 2698 9678

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Other Countries
Varian Vacuum Technologies
Via F.lli Varian, 54
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Tel: (39) 011 997 9111
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Internet Users:

Customer Service and Technical Support:
vpl.customer.support@varianinc.com

Worldwide Web Site:
www.varianinc.com/vacuum

Order On-line:
www.evarian.com

Representatives in most countries

VARIAN